

Description of a new species of *Conus* (Mollusca : Prosobranchia : Conidae) from Eastern Somalia.

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ABSTRACT. *Conus bozzettii* nov. spec. is described from North-Eastern Somalia. The new species is compared with several species known from the Indo-Pacific as well as from South and South-Western Africa, specially with *Conus gradatulus* Weinkauff, 1875 and *Conus patens* Sowerby, 1903 the identity of which remains to be cleared up.

RÉSUMÉ. *Conus bozzettii* est décrit du Nord-Est de la Somalie. La nouvelle espèce est comparée avec plusieurs espèces de l'Indo-Pacifique aussi bien que de l'Afrique du Sud et du Sud-Est, en particulier avec *C. gradatulus* Weinkauff, 1875 et *C. patens* auct., l'identité de *C. patens* Sowerby, 1903 restant à éclaircir. L'espèce est lisse, blanche, le plus souvent maculée de marron, et possède une spire de type paucispiral, des tours de spire bordés d'un talus en saillie et ornés de fines stries axiales. Sa taille adulte varie entre 45 et 62 mm.

KEYWORDS. Conidae, *Conus*, new species, North-Eastern Somalia.

INTRODUCTION.

Some time ago a lot of 13 specimens of unidentified *Conus* from Eastern Somalia were submitted to me for examination and determination. After examination of numerous possibly related taxa, I had to conclude that this was an unknown, yet undescribed species. The new species shows some variability in its colour pattern, but its morphological characters are constant and well distinct from those of related species.

Conus bozzettii, nov. sp.

DESCRIPTION.

Shell chalky white, light and thin. Body whorl smooth and moderately glossy.

Protoconch : rather broad (1 to 1,2 mm) and low, pure white, with 1,5 to 2 whorls. (See fig. 10).

Spire : postnuclear whorls are 9 to 10, depending on shell maturity. The spire whorls form a heightened slope on their external periphery, the slope of which is distinctly nodulose on the 5 or 6 earliest whorls. These nodules become obsolete on the remaining whorls, where they are slightly varicose.

Whorls concave and strongly grooved with closeaxial striae, curved towards the left and which become weaker on the last 2 or 3 whorls.

Shoulder : carinate and bordered with a moderately swollen slope.

Body whorl : sides slightly sigmoid. The body whorl is smooth with very fine, faint axial growth-lines, only the base is ridged with 5 to 8 oblique, closely spaced flat and duplicate ribs, more prominent on the ventral side.

Aperture : inside pure white, outer lip thin and sharp. Aperture rather narrow, almost parallel to the columellar edge. The base is pointed, the columellar fold stretched and hardly visible, except in fully mature specimens.

Pattern : spire uniformly white or dotted with more or less regular chestnut brown punctiform dots which are disposed around the spire-slope. On the midbody, some chestnut blotches form an interrupted spiral band. In some specimens, this band is spirally interrupted with small white bands ; in other ones the spiral band is spotted with small brown dots. Sometimes there are light chestnut brown dashes below the shoulder, sometimes the entire body whorl

is spangled with small chestnut dots. Some specimens are completely pure white.

Periostracum : rather thick, brown and slightly fluffy.

MORPHOMETRIC INDICATIONS : (See Tables 1 to 4).

Average size : 48,27 mm.

Average height of the shell/ width ratio : 2,18.

Average height of shell/ height of spire ratio : 4,79.

Average apical angle: 89,15°.

MATERIAL EXAMINED :

13 specimens from 38 to 62,5 mm :

Holotype : 62,5 x 26,7 mm

Paratype n° 1 : 51 x 23,3 mm

Paratype n° 2 55 x 26,3 mm

Paratype n° 3 54,8 x 24,3 mm

Paratype n° 4 52 x 23,5 mm

Paratype n° 5 50,7 x 22,5 mm

Spec. n° 6 to n° 12 from 47 to 38 mm

Holotype and paratype n° 1 are deposited at the Museum National d'Histoire Naturelle (M.N.H.N.) in Paris. Paratype n° 2 is deposited at the Natal Museum Pietermaritzburg, South Africa. Paratype n° 3 in coll. of the author. Paratypes n° 4 and 5 in coll. Bozzetti.

TYPE LOCALITY :

Holotype and all the original material were dredged by fishermen in 150 to 200 m. depth from a few miles of Cape Raas Haafuun, North-Eastern Somalia.

DISTRIBUTION :

The new species seems to be endemic to this restricted area.

ETYMOLOGY :

The species is named in honour of Mr Luigi Bozzetti from Milano, who provided the original specimens.

DISCUSSION.

Conus bozzettii belongs to a large group of *Conus* generally classified in the subgenus *Endemoconus* Iredale, 1931.

This group notably includes *C. sieboldi* Reeve, 1848 (synonym : *C. rarimaculatus* Sowerby, 1870), *C. borneensis* Adams & Reeve, 1848, *C. pergrandis* Iredale, 1937 (synonym : *C. fletcheri* Petuch & Mendenhall, 1972), *C. teramachii* Kuroda, 1956 (possible synonym : *C. neotorquatus* da Motta, 1985, a new name for *C. torquatus* von Martens, 1901 - non (Röding, 1798)), *C. ione* Fulton, 1938. All these taxa differ from *C. bozzettii* in many morphological characters, specially in the structure of their spire and body whorl, or in their protoconch of intermediate multispiral type.

The closest species are *C. gradatulus* Weinkauff, 1875 (synonym : *C. oltmansianus* Van Lennep, 1876) and *C. patens* auctorum (see below), both from South Africa.

1) *Conus gradatulus* Weinkauff (9 specimens studied) was misidentified by WALLS (1979 : 71-72, figs.) as "*C. altispiratus*" Sowerby, 1973, another valid species. *C. gradatulus* shows a strong, broad and elevate protoconch of 2 to 2,5 coils. Spire formed by 8 postnuclear whorls (9 to 10 in *C. bozzettii*). Apex pink. The nodules observed in *C. bozzettii* are absent. Some specimens show vague nodulose swellings on the outer edge of the spiral whorls. Body whorl of translucent porcellaneous white shaded with pinkish wide spiral bands, sometimes overprinted with undulating darker pink flammules. Aperture pinkish inside.

Number of postnuclear whorls : 8.

Sizes : from 34 to 78,3 mm.

Average size : 56,55 mm.

Average ratio height/width : 2,19.

Average ratio height / height of the spire : 4,26.

Average apical angle : 73°.

According to Dr. R.N. Kilburn from Natal Museum (pers. comm.), the species is endemic to the Agulhas Bank (Sth. Afr.) ; some small specimens were dredged in Southern Transkei, which appears to be the eastern most limit of the range of this species. Consequently the specimens cited from Madagascar in the literature might have been misidentified, and perhaps confused with specimens of *C. teramachii*.

Table 1.

Specimens of <i>Conus bozzettii</i>	Height	Width	Number of postnuclear whorls	Height of body whorl	Height of spire	ratio H/W	ratio H/Hspire	Apical angle	Remarks
Holotype	62.5	26.7	10	48	14.5	2.34	4.31	81°	
Parat. 1	51	23.3	10	39.6	11.4	2.18	4.47	83°	with periostracum
Parat. 2	55	26.3	10	45.5	9.5	2.09	5.78	100°	
Parat. 3	54.8	24.3	10	44	10.8	2.25	5.07	91°	punctate spire
Parat. 4	52	23.5	10	42	10.0	2.21	5.30	90°	partial periostracum
Parat. 5	50.7	22.3	10	37	13.7	2.27	3.70	84°	partial periostracum
Spec. n° 6	47	21.4	9.5	36	11.0	2.19	4.27	88°	all white
Spec. n° 7	45.7	22.2	10	36	9.7	2.06	4.71	90°	with periostracum
Spec. n° 8	46	22.3	9	37.3	8.7	2.06	5.28	96°	punctate spire
Spec. n° 9	45.6	20.7	9.5	36.7	8.9	2.20	5.12	97°	punctate spire
Spec. n° 10	40.5	17.5	9	32	8.5	2.31	4.76	80°	all punctate
Spec. n° 11	38.8	17.8	9	31	7.8	2.18	4.97	88°	partially punctate
Spec. n° 12	38	18.2	9	30	8	2.09	4.75	91°	
Average measurements and ratios	48.27	22.1	9.61	38.08	10.19	2.18	4.79	89°9'	

Note : measures taken with a caliper square modified after the model proposed by KOHN & RIGGS

2) *Conus patens* Sowerby, 1903 was described from 13 miles 10 N-E of Vasco de Gama Peak, a hill over Cape Point, South Africa. Its true identity is hard to establish from its holotype (South African Museum, Cape Town, S.A.) as well as from its original description. In Dr. Kilburn's opinion, the holotype may be considered as a subspecies, or at least, as an ecomorph of *C. gradatulus*. According to D. Röckel (pers. comm.) it refers also to the same species. The question remains under discussion.

Thus, the present comparison is grounded on specimens (4) of what is generally admitted to be *C. patens*, and that I prefer to call *C. patens* "auctorum"

(non Sowerby). No perfect specimen was available for study. According to Dr. Kilburn, the bad and corroded conditions of the available specimens may be due to the presence of organic acids in the muddy substrate that constitutes the habitat of *C. patens* auct. A similar erosion, but with less damaging effects, is also observed in *C. bozzettii*.

Number of postnuclear whorls : 8.

Sizes : from 48,8 to 70 mm.

Average size : 60 mm.

Average ratio height/ width : 1,96.

Average ratio height/ height of the spire : 5,09.

Average apical angle : 97,15°.

Table 2. Indicative numeric data.

	<i>Conus gradatulus</i>	<i>Conus patens</i> auct.	<i>Conus bozzettii</i>
H - HEIGHT			
mini.	34	42.8	38
maxi.	78.3	70	62.5
MEAN	56.55	60.07	48.27
Stand. deviation	16.89	10.76	6.75
max. % deviation	+38.46% / -39.87%	+16.53% / -28.74%	+29.48% / -21.27%
W - WIDTH			
mini.	14.6	22.3	17.5
maxi.	36.6	36	26.7
MEAN	25.86	30.57	22.1
Stand. deviation	7.99	5.47	2.83
max. % deviation	+41.53% / -43.54%	+17.76 % / -27.05%	+20.81% / -20.81%
Hbw - height of body whorl			
mini.	24.5	35	30
maxi.	60.4	57.5	48
MEAN	43.40	47.82	38.08
Stand. deviation	13.42	9.18	5.34
max. % deviation	+39.17% / -43.54%	+20.24% / -26.80%	+26.05% / -21.21%
Hsp - height of the spire			
mini.	8.1	7.8	7.8
maxi.	17.9	16	14.5
MEAN	13.12	12.25	10.19
Stand. deviation	3.51	3.21	1.98
max. % deviation	+36.43% / -38.26%	+30.61% / -36.32%	+42.29% / -23.45%
- H-W correl. coef.	0.994	0.984	0.954
Hbw-Hsp correl. coef.	0.983	0.358	0.620
H-Hsp correl coef.	0.989	0.604	0.532

Remarks :

- 1) If the H-W correlation coefficient indicates that Height and Width evolve correlatively with the shell maturity, this also seems the case in Hbd - Hsp correlation, but only in *C. gradatulus* (0,983), this coefficient being very less significant in *C. bozzettii* (0,620) and nearly insignificant in *C. patens* auct. (0,358).
- 2) Among the three compared species, *C. bozzettii* shows the lowest standard deviations.
- 3) The correlation between H and Hsp is very significant in *C. gradatulus*, but little convincing in *C. bozzettii*.

Table 3. Significant numeric and statistic data.

	<i>Conus gradatulus</i>	<i>Conus patens</i> auct.	<i>Conus bozzettii</i>
AA - Apical angle			
mini.	69°	80°	80°
maxi.	81°	106°	100°
MEAN	73°	97° 9'	89° 9'
Stand. deviation	3.36	10.23	5.89
max. % deviation	+10.95% / -5.48%	+9.10% / -17.65%	+12.17% / -10.26%
AA-H correl. coef.	0.251	0.078	0.060
AA-W correl. coef.	0.188	0.078	0.165
AA-Hsp correl. coef.	0.188	-0.827	-0.490
H/W - ratio			
mini.	2.11	1.89	2.06
maxi.	2.32	2.04	2.34
MEAN	2.19	1.96	2.18
Stand. deviation	0.07	0.06	0.09
max. % deviation	+5.93% / -3.65%	+4.08% / -3.57%	+7.33% / -5.50%
H/Hsp - ratio			
mini.	3.57	3.70	3.70
maxi.	4.55	6.37	5.78
MEAN	4.26	5.09	4.79
Stand. deviation	0.27	0.97	0.51
max. % deviation	+6.80% / -16.19%	+25.14% / -27.30%	+20.66% / -22.75%

Remarks :

1. The Apical Angle (AA) is highly variable in the concerned species, and generally in all species in the family Conidae. The low values of correlation coefficients between H or W and AA indicate that there are very poor relations between these characters, and thus that the Apical Angles are highly independent characters.

2. Concerning the correlations between Apical Angles (AA) and H, the correlation coefficient of *C. patens* auct. and *C. bozzettii* show negative values. This indicates that in both species these values are dependent, but negatively. This means that the increase of one value induces the decrease of the other one, and conversely.

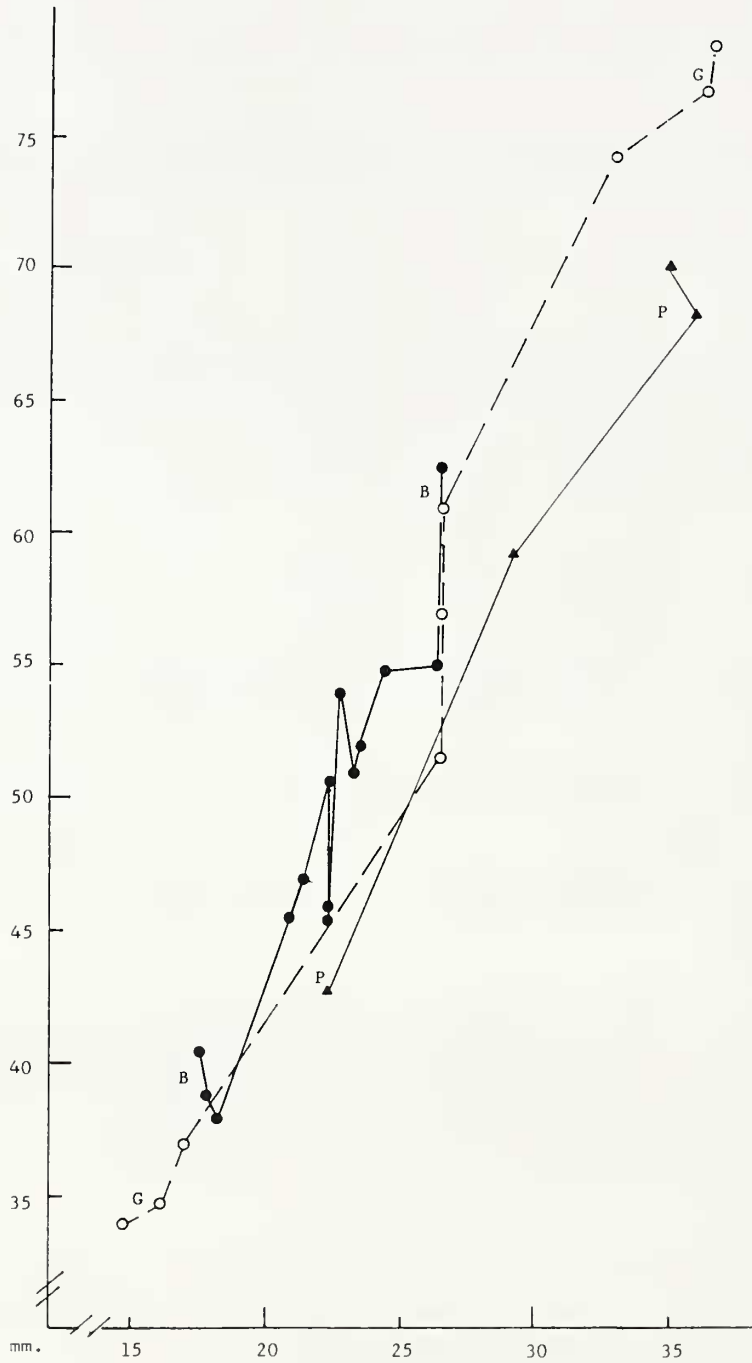
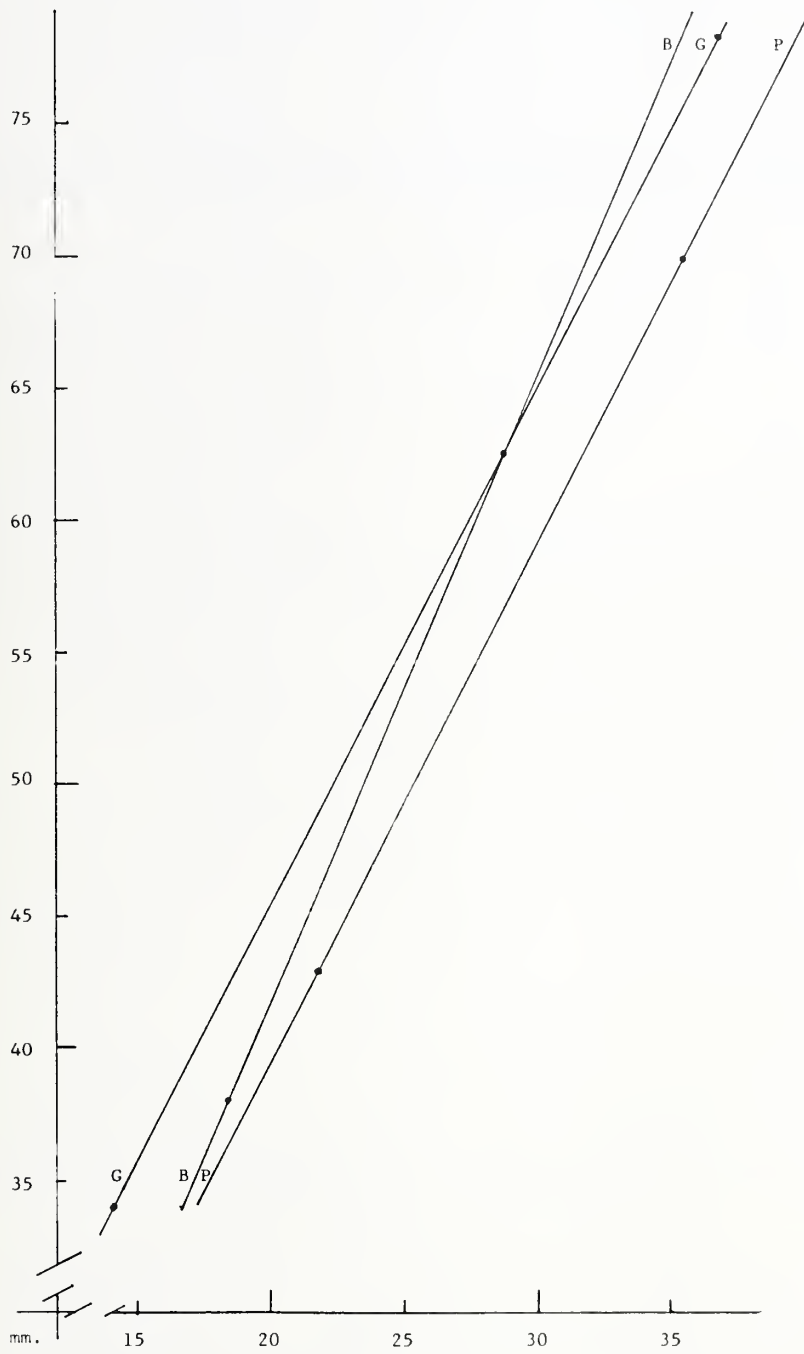


Diagram of the Height / Width ratio. (x = Width, y = Height). B = *C. bozzettii*, G = *C. gradatulus*, P = *C. patens* auct.



Graph of Covariance : linear regressions of the H/W ratios. (x = Width, y = Height).
 B = *C. bozzettii*, G = *C. gradatulus*, P = *C. patens* auct.

Table 4. Morphological characters

Characters	<i>Conus gradatulus</i>	<i>Conus patens</i> auct.	<i>Conus bozzettii</i>
PROTOCONCH			
Number of whorls (1)	2 to 2.5 w.	2 to 2.5 w.	1.5 to 2 w.
Height	1.6 to 1.8 mm	0.9 to 1.1 mm	0.7 to 0.9 mm
Width	1.3 to 1.5 mm	1.1 to 1.4 mm	0.9 to 1.1 mm
Colour	pale pink	creamy white	pure white
SPIRE			
shape	elevate, concave	rather low, concave	very variable in height, slightly concave to slightly convex
Number of whorls (1)-(2)	7.5 to 8.5 (mean : 8)	7 to 8 (mean : 7.75)	9 to 10 (mean : 9.61)
SPIRE WHORLS			
Profile	concave, high border slope	concave, broad and high border slope	slightly concave or straight. Low but prominent border slope.
Spiral sculpture	very fine, obsolete lines	rather deep fine striae sometimes obsolete or absent.	totally absent
Axial (radial) sculpture	faint, fine striae	faint, fine striae	strongly engraved, close and curved striae
Slope sculpture	absent	absent	earlier whorls with fine and close nodules, becoming obsolete on further whorls.
Suture	linear	linear	undulating
SHOULDER	angulated, smooth	strongly angulated	carinate with a slight, more or less prominent flange
BODY WHORL			
Surface	smooth and glossy	smooth and dull	smooth and glossy
Profile	nearly straight, slightly sigmoid	nearly straight, slightly sigmoid	elongate, sigmoid
Sculptures	faint axial and spiral striae	very faint or absent	very faint axial and spiral striae
Basal sculptures	very faint, numerous and close costulations	idem	from 5 to 8 flat, closely spaced and duplicate ribs

Table 4 (continued). Morphological characters.

Characters	<i>Conus gradatulus</i>	<i>Conus patens</i> auct.	<i>Conus bozzettii</i>
APERTURE			
Width	rather narrow, outer lip parallel to the columellar lip	idem	narrow. Outer lip strait or showing a slight concave depression towards the median.
Inside colour	more or less pinkish	creamy to white	chalky white
Lip	fine and sharp	idem	very fine and fragile, sharp
Columellar fold	very narrow, hardly visible	idem	stretched, hardly visible
"Anal" notch	deeply indented	moderately indented	little indented
COLOUR PATTERN			
Background	porcellan white to pale pinkish	ivory to creamy white	chalky pure white
Spire	pinkish suffusions, orange-pink vague dashes	uniform creamy white	uniform white or spotted with more or less numerous chestnut dots
Body whorl	pinkish suffused bands overlapped with some more or less deep orange pink, large flamules	uniform creamy white	interrupted spiral band or brown dashes. Sometimes uniformly white or spotted.
PERIOSTRACUM	Thin, smooth and translucent	idem	rather thick, opaque and slightly fluffy

Remarks :

1/ Up to now, no universally recognized method for counting the protoconch whorls (or coils) appears to be available. This counting presents about 0,5 whorl differences for a same species, depending on authors and methods. Expecting a precise and useful method (nearly ready for press by the present author), the disputable method of KERNEY & CAMERON (1979) is here applied. Obviously a precise counting of the postnuclear whorls depends on a precise one of the protoconch whorls, although the number of postnuclear whorls is function of the shell maturity, and cannot be retained as a discriminant isolated character.

2/ Long studies and measurements of numerous specimens of many *Conus* species revealed that the number of postnuclear whorls (nuclear whorls being generally unvariable in a same species) does not depend on the sizes (heights) of the shells, but on their maturity (sizes of mature specimens in a same species depending on the more or less well adapted conjunction between the genotype and its ecological environment). Thus the size of a shell is only an indicative but not a determinant information for an estimation of the shell maturity.

Figs. 1-2 - *Conus bozzettii*. Holotype 62,5 x 26,7 mm.

Fig. 3 - *Conus bozzettii*. Spire of the holotype.

Fig. 4. *Conus bozzettii*. Paratypes n° 1 (51 x 23.3 mm) and n° 2 (55 x 26.3 mm).

Fig. 5. *Conus bozzettii*. Specimens n° 6, 7 and 8.



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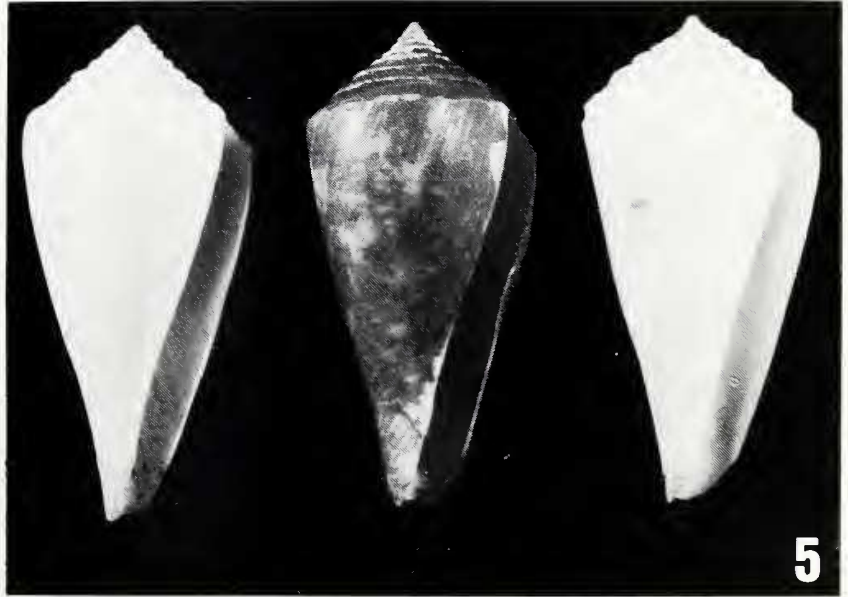
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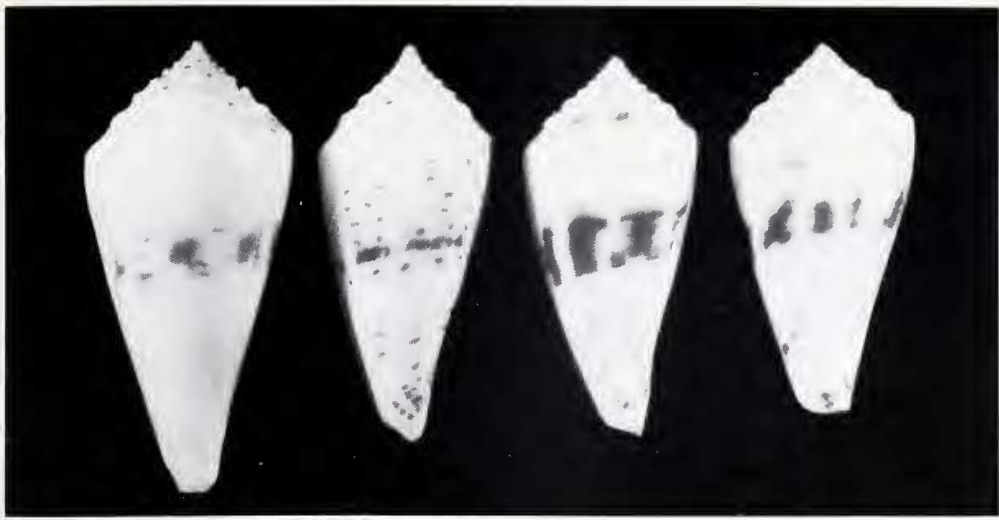


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Fig. 6. *Conus bozzettii*. Variability of the patterns. Specimens n° 9 to 12.

Fig. 7. *Conus patens* auct. Natal Museum: 70 x 35 mm.

Fig. 8. *Conus gradatulus* Weinkauff. Z.M.A. (66 x 29 mm). Coll. Lauer (57 x 26 mm) and Natal Museum (56 x 26 mm).



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Fig. 9. *Conus bozzettii*. Spire of paratype n° 5.

Fig. 10. *Conus patens* auct. : spire of specimen figured in fig. 8 (Natal Museum n° A 2964, Walvis Bay, South Africa).



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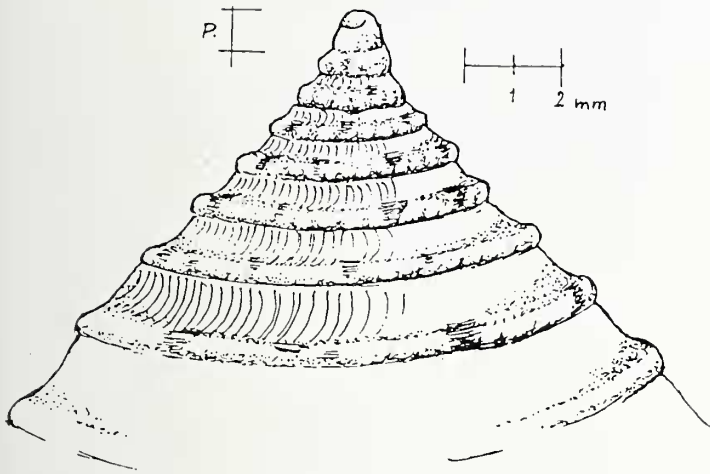
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Fig. 11. *Conus bozzettii*. Spire, specimen n° 9 (fig. 6).

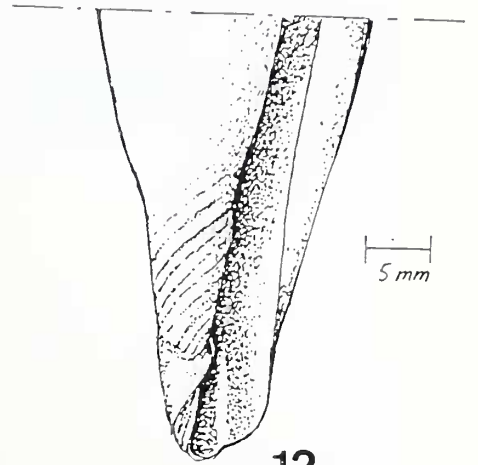
Fig. 12. *Conus bozzettii*. Base of the holotype.

Fig. 13. Protoconch and early whorls of *C. gradatulus*.

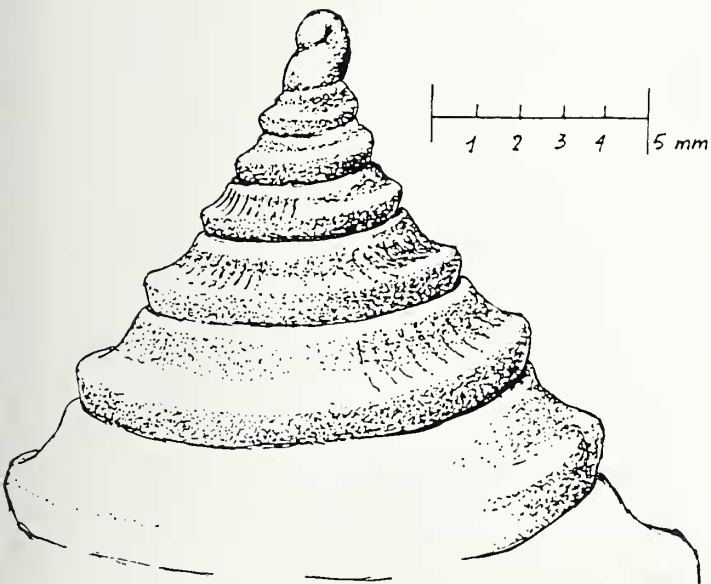
Fig. 14. Protoconch and early whorls of *C. patens* auct.



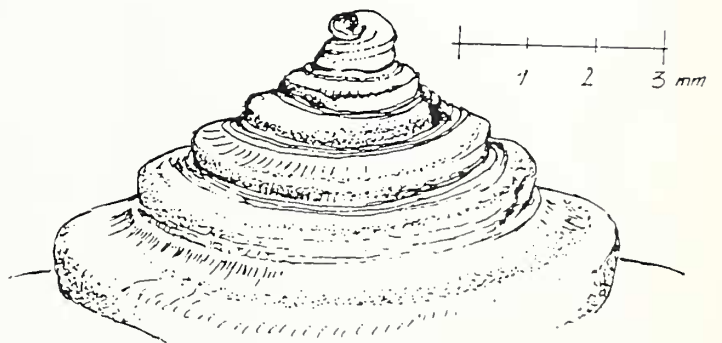
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Acknowledgments.

The author is grateful to Dr. R.N. Kilburn (Natal Museum), to Dr. R.G. Moolenbeek (Zoölogisch Museum van Amsterdam) and to Dr. G. Richard (Ecole Pratique des Hautes Etudes, Laboratoire de Malacologie, Museum National d'Histoire Naturelle, Paris) for the loan of specimens and for their helpful advice.

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